

REMARKS

Summary of Claim Status

Claims 1, 4, 6-11, 14, 17, 19, and 20 are pending in the present application after entry of the present amendment. Applicants have canceled Claims 5, 15, and 37, thereby rendering rejection of these claims moot. Claims 1, 4, 6-11, 14, 17, 19, and 20 are rejected for the reasons discussed below.

Applicants respectfully request favorable reconsideration of the claims and withdrawal of the pending rejections in view of the present amendment, which are believed to place the application in form for allowance, and in light of the following discussion.

Rejections Under 35 U.S.C. § 103

Claims 1, 4-11, 15, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Rumer et al., U.S. Patent Application Publication No. 2004/0238947 ("Rumer"), in view of Tosaya et al., U.S. Patent No. 6,538,320 ("Tosaya"). Applicants respectfully traverse the rejection with regard to all claims, and submit that Rumer and Tosaya, alone or in any combination, do not teach or even suggest the present invention. However, Applicants believe the rejection is moot in light of the above amendments, which are believed to place the application in form for allowance. Therefore, Applicants respectfully request entry of the amendment and allowance of the claims.

In particular, Applicants have amended Claim 1 to recite that an adhesive secures the conductive lid to the substrate of the integrated circuit by applying a force along a wall of the tapered through-hole, the wall extending substantially vertically from the substrate. Applicants respectfully submit that Rumer and Tosaya, alone or in any combination, do not teach or suggest such features.

As shown in Figs. 2-4 of Rumer, the attachment of a heat spreader in Rumer is effected by the use of fasteners 210, 310, and 410, respectively. Importantly, as can be clearly seen in Figs. 2-4 of Rumer, the force that attaches the heat spreader is applied only at the head of the fastener in the small countersink area of the hole. That

is, a downward force is applied only between the head of the fastener and a small area that is parallel to the plane of the substrate. Furthermore, since the holes shown in Rumer are perfectly perpendicular and have no taper, it would be impossible for a force to be applied along the surfaces of the holes using Rumer's fasteners, since all of the force vectors would be parallel to such surfaces.

Similarly, in Tosaya, the heat spreader 102 is mounted on package board 112 by an adhesive 116 forming a head on a flange 103 that is substantially planar to the plane of the package board. See, e.g., Tosaya at Fig. 4, col. 2, lines 38-42, and col. 2, lines 59-66. In fact, Tosaya describes the connection as a "riveted connection." Tosaya at col. 2, line 63. Thus, it is clear that in Tosaya, as with Rumer, the primary force for attaching the heat spreader to the package board is a force applied by the "head" of the adhesive against the planar flange portion. That is, the adhesive used in Tosaya is essentially equivalent to the riveted connection of Rumer. Thus, in both Rumer and Tosaya, the attachment force is applied against a surface that is parallel to the plane of the substrate.

In contrast, Claim 1 recites a tapered through-hole, and that the lid is secured by an adhesive applying a force along a wall of the tapered through-hole that extends substantially vertically from the substrate. Neither Rumer nor Tosaya teaches or even suggests a tapered through-hole, and such a tapered through-hole has clear advantages over the non-tapered holes of the references. For instance, as would be readily understood by one of skill in the art and as clearly shown in Fig. 5, the taper of through-hole 304 is wider at the top than at the bottom, and thus when filled with 518 forms a "plug" that resists detachment of the lid. The tapered shape allows force to be applied along the wall of the through-hole, and thus offers advantages over the rivets of Rumer and Tosaya. For example, the wall of the tapered through-hole has a greater surface area than the small parallel planar areas of Rumer and Tosaya, and therefore has potentially greater adhesive force. Also, a tapered through-hole as recited in Claim 1 may allow for a more compact package, since no space needs to be reserved for the countersink of Rumer or the planar flange of Tosaya. Other advantages and unexpected results will be evident to those of skill in the art upon examination of Fig. 5 of the present application.

Therefore, Applicants believe Claim 1, as amended, is allowable over the references, and Applicants respectfully request entry of the amendments and allowance of Claim 1, and the claims depending from Claim 1.

Applicants have amended Claim 11 to recite that the through-hole comprises a frustum-shaped through-hole, and that the adhesive secures the conductive lid to the substrate by applying a force along a surface of the through-hole extending substantially vertically from the substrate. Applicants respectfully submit that Rumer and Tosaya, alone or in any combination, do not teach or suggest such features.

First, neither Rumer nor Tosaya teaches or suggests a frustum-shaped through-hole, and as noted above and as plainly evident in Fig. 5, a frustum-shaped through-hole has clear advantages over the rivets of Rumer and Tosaya. That is, it would be clear to one of ordinary skill in the art that such a shape has an unobvious purpose and produces an unexpected result. For example, the shape may provide an increased surface area for adhesion, and may reduce the size of the package.

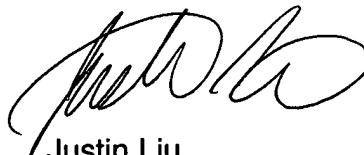
Furthermore, neither Rumer nor Tosaya teaches or suggests a force applied along a surface extending substantially vertically from the substrate. In fact, both references teach away from such a feature in providing a force that is only applied along a surface that is parallel to the plane of the substrate.

Therefore, Applicants believe Claim 11, as amended, is allowable over the references, and Applicants respectfully request entry of the amendments and allowance of Claim 11, and the claims depending from Claim 11.

Conclusion

Applicants respectfully request that the Examiner reconsider the final rejection and consider the above amendments and arguments. These arguments are believed to clearly indicate that the application including Claims 1, 4, 6-11, 14, 17, 19, and 20 should be allowed. Therefore, Applicants respectfully request allowance of the application. If any action other than allowance is contemplated by the Examiner, the Examiner is invited to telephone Applicants' attorney at 408-879-4641.

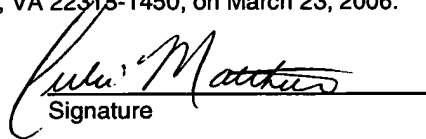
Respectfully submitted,



Justin Liu
Attorney for Applicant
Reg. No. 51,959

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. BOX 1450, Alexandria, VA 22313-1450, on March 23, 2006.

Julie Matthews
Name


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